

# Environmental Protection Agency

## **Canister Preconditioning Procedure**

This procedure is written for the Environmental Protection Agency, National Vehicle and Fuel Emissions Laboratory (NVFEL) internal use. The use of specific brand names by NVFEL in this procedure are for reference only and are not an endorsement of those products. This document may be used for guidance by other laboratories.

### **NVFEL Reference Number**

720B

### **Implementation Approval**

Original Procedure Authorized by EPCN #188 on 10-16-95

### **Revision Description**

- (1) 08-05-98 The purpose of this change is to revise the procedure as described in EPCN #230.

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## 1. Purpose

The purpose of this procedure is to precondition the vehicle canister for the supplemental two-diurnal or three-diurnal evaporative and exhaust emission test sequence. The two-diurnal sequence preconditioning incorporates an auxiliary canister connected to the vehicle canister to collect excess butane vapor once the vehicle canister is loaded to breakthrough.

## 2. Test Article Description

1996 and later model year light-duty vehicles.

## 3. References

- 3.1 "Code of Federal Regulations," Title 40, Part 86, Sections 130, 132, 133, and 138
  - 3.2 "Mail-out #95," State of California, Air Resources Board, Notice of Public Availability of Modified Text
  - 3.3 Sierra Instruments 830/840/860 Mass Flow Meters & Controllers Instruction Manual
  - 3.4 Sartorius Laboratory "L220 S-X, L2200 S-X Operating Instruction Manual"  
Sartorius "Interface Converter 725324-1 Operating Instructions"
  - 3.5 Test Procedures: TP 703, TP 707, and TP 710
- Note:** All references to the Test Procedures include the those referenced and all subsequent revisions thereof.
- 3.6 Environmental Protection Agency (EPA) current safety policies
  - 3.7 "LabVIEW 3.1 User Manual"
  - 3.8 Bebeco Industries Enclosure Protection System Model 1002, Type "2" Rapid Exchange Purge System, Installation, Operation, and Maintenance Manual

## 4. Required Equipment

- 4.1 Form 720-01, "Canister Preconditioning" (Attachment B)

4.2 Form 708-01, "Vehicle Test Data Sheet"

4.3 Form 903-01, "Test Status Report"

4.4 Auxiliary Canister

Equipment used: Chrysler Part # 4241837

4.5 Computer Data Acquisition and Control System:

4.5.1 Microcomputer

Equipment used: Apple Macintosh Power PC 7100/66

4.5.2 Video Monitor

Equipment used: Radius 20" Intellicolor Display, Model # 0461

4.5.3 Data Acquisition Devices

Equipment used: National Instruments Boards NB-MIO-16L-9  
and NB-AO-6

4.5.4 Mass Storage Device

Equipment used: Quantum 500 MB Hard Drive

4.5.5 Printers

Equipment used: Hewlett Packard LaserJet 4 Plus

4.5.6 File Server Software

Equipment used: Apple Computer's Appleshare

4.5.7 Operating System

Equipment used: Macintosh version 7.5

4.5.8 Data Acquisition & Control Software

Equipment used: National Instruments LabVIEW 3.1.1, with EPA  
Developed Canister Virtual Instrument (vi.) Version 1.0.1

#### 4.5.9 Computer Data Acquisition and Control System Cabinet

Equipment used: Hoffman APX-PC Enclosure, with two window doors, keyboard compartment, pull out shelves, and cooling fan  
P/N: X-PCA1688

#### 4.5.10 Data Acquisition and Control Electronics Assembly fabricated by EPA, consisting of the following component parts:

Equipment used: Hoffman Pull Out Shelf: P/N: D-L29SHP

Lambda Electronics  $\pm 15$  Volts Direct Current (VDC)  
MFC Power Supply, Model # LND-Y-152

Lambda Electronics  $\pm 24$  VDC Solenoid Power Supply,  
Model # EWS100-24

Lambda  $\pm 5$  VDC Relay Board Logic, Model # EWS15-5

Flat cable to discrete wire Module: 50 conductor, for  
National Instrument Boards:  
Phoenix Contact P/N: 22 81 08 9, Type: FLKM50

Flat cable to discrete wire Module: 20 conductor, for  
MFC Cables:  
Phoenix Contact P/N: 22 80 01 9, Type: FLK20

Fused Surge Suppressing Terminal Block for MFC  
signals  
Phoenix Contact P/N: 70 05 89 7,  
Type: Special of DOKD 1, 5 TG

Terminal block, 4 conductor, to distribute  $\pm 15$ VDC to  
MFCs: Phoenix Contact P/N: 27 18 20 6,  
Type: VIOK 1,5-3D/PE

Terminal Block Integrated Diode for Solenoid Valve  
circuits: Phoenix Contact P/N: 27 91 01 6,  
Type: UKK5-DIO/O-U

Terminal Block Double Level with Ground Foot for  
Solenoid Valve circuits and distribute 120VAC power:  
Phoenix Contact P/N: 04 61 01 8, Type: SLKK5

Octal Relay Base for emergency shutdown relay.  
Phoenix Contact P/N: 70 01 21 3, Type: RMOB JR-2

Relay for power supply emergency shutdown.  
Potter and Brumfield P/N: KRP-14AG-120

Relay Board, OPTO-22, Model # G4P38

Relays, OPTO-22, Model # G40DC5MA

Terminal Board Enclosure  
Hoffman NEMA 12,13 Model # C-SD16128

Cabinet Cooling Fans - Hoffman Muffin 6"

4.6 Test Ambient Monitoring System:

Equipment used: Dew-point Hygrometer Monitor  
General Eastern Hygro-M2 with chilled mirror humidity sensor  
and RTD temperature sensor

Digital Barometer  
Bell and Howell Digital Barometer

4.7 Combustible Gas Detector System (CGDS)

Equipment used: Rexnord Model 2000 and/or Drager Polyton IR EX with Regard  
Control System

4.8 Electronic Scale

Equipment used: Sartorius L2200 S-X with a Sartorius Interface  
Converter 725324-1

4.9 Scale Enclosure

Equipment used: Hoffman Special Enclosure 566BF (C-SD121213W)

4.10 Uninterruptible power supply

Equipment used: Controlled Power, Model # HV-10500

4.11 Dehumidifier

Equipment used: Sears Dehumidifier, Model # 106.95501 modified with tunnel and  
cooling coil

## 4.12 Flow Management System:

Equipment used: Butane Mass Flow Controller (MFC)  
Sierra, Model # 840D-L-1-V1-ON-SK

Nitrogen MFC  
Sierra, Model # 840D-L-1-V1

Purge Air MFC  
Sierra, Model # 840D-M-1-V1

Explosion-proof Solenoid Valves  
ASCO, Models EF8262G86 & EF8210G87

Explosion-proof NEMA4 Terminal Box  
GS O-Z/Gedney, Model # GUB-443A

Flow Component Enclosure  
Hoffman, NEMA 12,13, Model # C-SD302412W

Flow Component Enclosure Purging System:  
Bebco, Model 1002-WPS Type "2"

Purging System Enclosure Protection Vent:  
Bebco Model EPV-2-PG-90

## 4.13 Liquid Butane

Equipment used: 99% minimum liquid phase, Chemically Pure Grade

## 4.14 Butane Cylinder Safety Storage Cabinet

Equipment used: AGA Gas Inc.  
Model #A7007

## 4.15 Butane Tank Scale

Equipment used: AGA Scale for weighing butane cylinders

## 4.16 Vacuum Pump

Equipment used: Snap-on Combination Vacuum and Pressure Pump Kit,  
Model #YA4000

## 5. Precautions

- 5.1 Care must be taken when operating equipment using combustible gases.
- 5.2 If readings of the CGDS exceed 5% of the lower explosion limit (LEL), leaks in the butane delivery system or other sources of hydrocarbons, such as gasoline vapor, may be present.  
  
If the CGDS reaches a high level alarm of 40% LEL, the CGDS will automatically shut off power to the flow cabinet, which will close all valves. The canister preconditioning program must be shut down immediately.
- 5.3 The red light next to the hood must not be illuminated. If it is on, it indicates no air flow through the hood.
- 5.4 The “Uninterruptible Power Supply” (UPS), the power switch for the combustible gas detector, the power switch for each Canister Preconditioning System (CPS), and the dew-point hygrometer must be on 24 hours a day.
- 5.5 The dew-point hygrometer must be restarted and run through the “Automatic Pacer Cycle” if it has been turned off.
- 5.6 The compressed air system must be on.
- 5.7 Familiarity with the Macintosh computer system and LabVIEW software is necessary.
- 5.8 If the total flow of butane is greater than 2 times the canister capacity and the balance has not gained more than 0.1 grams, the “Canister.vi” program will stop the flow of butane to the canister.

## 6. Visual Inspection

Visual inspection of the test setup is performed; specific inspections for visual inspection are covered in Section 7, Test Article Preparation.



## 7. Test Article Preparation

If you are unfamiliar with the Macintosh computer system, you must review the tutorial tapes available from the Lab Automation Group. If you are unfamiliar with the LabVIEW software, you must obtain user training from a VT senior technician formally trained in it. A short description of the LabVIEW components used in the “Canister.vi” program and how they function are in Attachment A.

For canister preconditioning described in 40 CFR 86.130, one of the following methods will be used to precondition multiple evaporative emission canisters during the soak period:

For vehicles with multiple canisters in a series configuration, the canisters must be preconditioned as a unit connected in series. Refer to manufacturer-supplied instructions for connecting canisters.

For vehicles with multiple canisters in a parallel configuration, each canister must be preconditioned separately.

- 7.1 Verify that Form 702-01 was completed after the vehicle preconditioning drive and the vehicle fuel tank has been drained and filled to its 40% tank fuel volume.
- 7.2 On Form 720-01, record the “Vehicle ID” and the “Test Number.” Indicate whether the procedure being used is the two-diurnal or the three-diurnal.

If multiple canisters are being preconditioned on separate benches, use a form for each canister. Add a sequential number after the original test number, e.g. 95-9999-1, 95-9999-2, etc., and record these test numbers on each individual form.
- 7.3 Verify that the butane cylinder scale is registering in the green zone. If it is in the red zone, the cylinder is low on butane and must be replaced.
- 7.4 Verify that the air compressor is on. If it is not on, verify that it indicates “Ready to Start” on the LED display and press the “Start” button. If it does not indicate “Ready to Start,” notify a VT senior technician. Allow 5 minutes for the compressor to build up pressure.
- 7.5 Verify that the compressed air supply pressure gauge is registering 50 psi. If not, notify a VT senior technician.
- 7.6 Verify that the CPS power is on by observing the red pilot-light switch mounted next to the computer monitor in the cabinet. If the power is off, switch it on and allow the equipment to warm up for a minimum of 30 minutes. When the power has been on for 30 minutes, place a check mark on Form 720-01.

- 7.7 At the start of each day press the dew-point “Pacer” button mounted on the hygrometer. This operates the hygrometer through a pacer cycle.
- 7.8 Turn on the computer by pressing the button in the upper right corner of the keyboard.
- 7.9 After the computer start-up is completed, double click on the “Canister.vi” icon to display the front panel on the computer screen.
- 7.10 Click on the panel palette “RUN” button. Monitor the ambient temperature displayed on the “Ambient Conditions” portion of the front panel. Verify that the ambient temperature is within 20°-30°C. If it is not, notify a VT senior technician.
- 7.11 Verify that the dew-point meter has completed the pacer cycle. When it is completed, monitor the specific humidity on the “Ambient Conditions” portion of the front panel. If performing the two-diurnal sequence, verify that the ambient humidity is within 0-70 grains/pound (gr/lb). If performing the three-diurnal sequence, verify that the ambient humidity is  $50 \pm 25$  gr/lb.

If the humidity is within specification, place a check mark on Form 720-01.

If the humidity is above the tolerance for the procedure being performed, turn on the dehumidifier. Adjust the valve on the ambient monitoring cabinet to draw conditioned air into the system. Check the humidity again. If it is within specification, place a check mark on Form 720-01.

If the humidity is below the tolerance or it cannot be controlled within the tolerances, notify a VT senior technician.

- 7.12 Inspect the test vehicle canister for any damage to the ports or vents. Verify that the canister hoses have been clearly labeled, or an illustration has been provided indicating which ports are connected to the canister hoses.

If there is no visible damage to the canister ports or vents, place a check mark on Form 720-01.

If there is visible damage, if the vehicle hoses are not labeled, or if illustrations are not provided, notify a VT senior technician.

- 7.13 For the two-diurnal, if necessary, remove the caps from the auxiliary canister and inspect for any damage to the ports or vents. If there is no visible damage to the canister ports or vents, place a check mark on Form 720-01.

If there is visible damage, notify a VT senior technician.

- 7.14 Inspect the CPS purge and load hoses for cracks or other damage that might cause leaks. If there is no visible damage to the hoses or clamps, place a check mark on Form 720-01.

If there is visible damage, notify a VT senior technician.

**Note:** See Attachment C, Figure 1 for canister purge connections.

- 7.15 Review Form 708-01, "Vehicle Test Data Sheet," in the "Comments" section and determine if the test vehicle is for 2-day or 3-day canister conditioning.

Connect the CPS purge hose to the auxiliary canister tank port (two-diurnal) or the vehicle canister tank port (three-diurnal). After connecting the hose, place a check mark on Form 720-01.

- 7.16 Connect the CPS return hose to the auxiliary canister vent port (two-diurnal) or the vehicle canister vent port (three-diurnal). After connecting the hose, place a check mark on Form 720-01.

- 7.17 For the three-diurnal, if the vehicle canister is equipped with a vacuum-activated valve, connect the hand-operated vacuum pump to the valve port. Apply a vacuum of approximately 10 inches of water to open the canister valve. The vacuum should hold the valve open and remain constant once negative pressure has been applied.

If a vacuum source is used, place a check mark on Form 720-01; otherwise write NA.

If the vacuum does not remain constant after several attempts, notify a VT senior technician.

- 7.18 For the two-diurnal, on Form 720-01, record the "Auxiliary Canister ID."

- 7.19 Verify that the hood air flow power switch is on.

## 8. Test Procedure

### 100 Canister Purge

**Note:** If for any reason the purge process must be terminated, the technician can click on the "Abort" button.

- 101 On the "Canister.vi" front panel, click on or to select "Purge" from the "Test Mode" selection then click on the arrows to select "2-day" or "3-day" from the "Test Type" selection.

- 102 Type in the following information in the corresponding spaces and after each item is typed in, press <enter>.
- Test Number
  - Vehicle ID Number
  - Operator ID Number
  - Baro (in Hg)
  - Canister Vol (L)
  - Canister Cap (g)
- 103 Click on the “Canister.vi” program “Start” button (see Attachment A).
- 104 Verify that all the information has been entered in the “Test Parameter” boxes, correctly. If the information is correct, proceed to Step 105. If erroneous information has been entered, click on the “Change” button and correct the entry. When the information is correct, click on the “Start” button.
- 105 Click on the “OK” button of the front panel to initiate the purge process. The “Canister.vi” program will automatically control and record data during the canister purging process. Verify that the specific humidity is within tolerance. To do this, verify that the LabVIEW screen is not displaying a specific humidity fault indicator located on the front panel under the button controls.
- If the “Fault” indicator is displayed, notify a VT senior technician.
- 106 Observe the “Purged Aux Data” digital indicator and verify that the canister is being purged at  $30 \pm 3$  standard liters per minute (slm) for the two-diurnal or  $22.65 \pm 3$  slm for the three-diurnal.
- If no flow is indicated, check the connections. If there is still no flow indicated, notify a VT senior technician.
- 107 Observe the left side of the front panel. When the “Total Air” digital indicator is equal to or greater than the “Target Air” digital indicator, the word “Volume” will appear in the yellow button, informing the technician that the purge process is complete.
- 108 The word “Abort” will change to “Clear” when the purge process is complete. Click on the “Clear” button.
- Place a check mark on Form 720-01.
- 109 Remove the CPS purge and return hoses from the (auxiliary or vehicle) canister.

**200 Vehicle Canister Load**

**Note:** If for any reason the loading process must be terminated, the technician can click on the “Abort” button.

The canister should not be removed from the vehicle unless access is so restricted that loading can only be accomplished by canister removal. If necessary, remove the canister from the vehicle. Special care should be taken during removal to avoid damaging fuel system components or compromising the fuel system integrity.

If it is removed from the vehicle, the canister should be positioned upright and securely fastened to the CPS bench so it will not tip over during canister preconditioning. Visually inspect the canister and its ports for damage. If damaged, notify the VT senior technician.

201 For the three-diurnal, verify that the load rate. If it is greater than  $15 \pm 2$  grams per hour, a Certification Representative must sign Form 720-01 indicating their approval.

202 Attach the CPS load hose to the canister tank port. When completed, place a check mark on Form 720-01.

**Note:** See Attachment C, Figure 2 (for two-diurnal) or Figure 3 (for three-diurnal) for canister load connections.

203 For the two-diurnal, place the auxiliary canister on the Sartorius scale and connect a hose to the inside port of the scale cabinet. Connect a hose from the vehicle canister vent port to the outside port of the scale cabinet. Close and latch the cabinet door.

For the three-diurnal, attach a hose to the vehicle canister vent port. Verify that the hose is under the vent hood.

When completed, place a check mark on Form 720-01.

**Note:** It is not necessary to connect and/or plug the auxiliary canister vent hose while in the scale cabinet since it will hold much more butane than the 2 grams that will flow into it.

204 Connect the vehicle manufacturer supplied slave canister to the vehicle fuel tank hose. This will prevent the escape of fuel tank vapors while the vehicle is on soak.

- 205 On the “Canister.vi” front panel, select “Load” by clicking on the on the “Mode” control.
- 206 Verify that all the information has been entered correctly on the computer. If erroneous information has been entered, click on the “Change” button and correct the entry.
- 207 Once the information is correct, click on the “Start” button. If performing the three-diurnal, proceed to Step 211.
- 208 At the computer, tare the Sartorius scale by clicking on the “Tare” button. Pause for 10 seconds and verify that the scale properly tares to  $0.0 \pm 0.01$  gram. If it does not, notify a VT senior technician.
- 209 Observe the auxiliary canister weight. Allow the scale to stabilize for a minimum of 1 minute. The weight should not vary by more than  $\pm 0.1$  grams for 1 minute. If the scale does not stabilize, notify a VT senior technician.
- 210 When the auxiliary canister weight has stabilized, click on the “OK” button to initiate the load process.
- 211 The “Canister.vi” program will automatically record and control the butane loading rate at 40 grams/hour for the two-diurnal and, unless the Certification representative has authorized a different loading rate, 15 grams/hour for the three-diurnal.

When the “Weight” digital indicator is equal to or greater than 2 grams for the two-diurnal or for the three-diurnal, when the total flow of butane is greater than 1.5 times the capacity of the vehicle canister, the system will automatically stop the flow of butane and nitrogen to the canister. The word “Weight” for the two-diurnal or “Volume” for the three-diurnal will appear in the yellow button, informing the technician that the load process is complete.

For the two-diurnal, if the total flow of butane is greater than 2 times the canister capacity and the balance has not gained more than 0.1 gram, the “Canister.vi” will stop the flow of butane to the canister and the word “Problem” will appear in the yellow button.

If the technician is unable to determine the source of the problem, they must notify the VT senior technician.

- 212 Verify that the LabVIEW screen is not displaying an ambient condition “Fault” indicator on its front panel. If the “Fault” indicator is displayed, the ambient temperatures were not within 20-30 °C. Notify a VT senior technician.

- 213 Verify that the LabVIEW screen is not displaying a flow condition “Fault” indicator on its front panel. If the “Fault” indicator is displayed, the butane total flow was not within  $\pm 5$  percent of the nitrogen total flow. Notify a VT senior technician.
- 214 The word “Abort” will change to “Clear” when the canister loading process is complete. Click on the “Clear” button. The “Canister Preconditioning Report” will automatically be printed.
- 215 Disconnect all the hoses from the preconditioned vehicle canister.
- 216 For the two-diurnal, disconnect the hoses from the auxiliary canister. Return to Section 100 and purge the auxiliary canister. When purged, cap the ports with the caps removed in Step 7.13.
- 217 If the vehicle canister was removed from the vehicle, carefully reinstall it so as not to damage any vehicle or canister components.
- 218 Reconnect all vehicle hoses to the vehicle canister. Refer to labels or manufacturer-supplied diagrams to ensure that all connections are correct. When completed, place a check mark on Form 720-01.
- 219 On Form 720-01, record your “Technician ID” number and today’s “Date.”

## 9. Data Input

- 9.1 The following data is recorded on Form 720-01:
- Test Number
  - Vehicle ID
  - Auxiliary Canister ID Number
  - Certification signature (for  $> 15$  g/h butane load rate)
- 9.2 The following data is entered in the "Canister.vi" program:
- Test Mode
  - Test Type
  - Test Number
  - Vehicle Number
  - Operator ID
  - Baro (inHg)
  - Canister Vol (L)
  - Canister Cap (g)

- 9.3 The following information is automatically recorded by the “Canister.vi” program:

CPS Station ID

Date

Purge Start, Finish & Elapsed Time

Load Start, Finish & Elapsed Time

“Canister.vi” Software Version

Auxiliary Canister Weight Gain (two-diurnal only)

Total Air or Butane Flow

Total Nitrogen Flow

Butane to Nitrogen Ratio

Finish Status

Fault(s)

## 10. Data Analysis

The technician who performs the procedure is required to perform Steps 10.1 through 10.3.6 and the technician validating the data is required to perform all the steps in Section 10.

- 10.1 Verify the following on the “Canister Preconditioning System Test Report”:

- 10.1.1 Verify that the canister volume and the canister capacity were accurately transcribed from the “Vehicle Information Data Sheet” or manufacturer-supplied instructions.
- 10.1.2 All manual entries were entered correctly.
- 10.1.3 The “Started” time, under the “Purge” column, is after the “End of Fill” time on Form 702-01.
- 10.1.4 The “Ended” time, under the “Load” column, is within 36 hours of the “VDA Summary Report Preconditioning Finished” time.
- 10.1.5 For the two-diurnal, the weight gain on the auxiliary canister was greater than 2 grams and less than 3 grams.
- 10.1.6 For the two-diurnal, the word “Weight” appears in the “Purge” and “Load” columns next to “Finish.” For the three-diurnal, the word “Volume” appears in the “Purge” and “Load” columns next to “Finish.”
- 10.1.7 The word “NO” appears in the “Purge” and “Load” columns next to “Fault.”



- 10.1.8 The technician entered their “Technician ID” number and the current “Date.”
- 10.2 Review Form 720-01 to ensure that it has been completely filled out.
- 10.3 Verify that the technician recorded their “Technician ID” number and the current “Date” on Form 720-01 and the “Canister Preconditioning System Test Report.”
- 10.4 The technician who validates the data entries records their EPA ID number in the “Verified by” space and the current “Date” on both Form 720-01 and the “Canister Preconditioning System Test Report.”

## **11. Data Output**

- 11.1 Form 720-01 is placed in the test packet.
- 11.2 The “Canister Preconditioning System Test Report” is filed in the test packet.
- 11.3 An electronic Excel<sup>®</sup> test file is stored on the computer hard drive.
- 11.4 A copy of all manufacturer-supplied instructions is placed in the test packet.

## **12. Acceptance Criteria**

- 12.1 The purge and load ambient temperatures must be within 20-30 °C.
- 12.2 The start and end times of the canister preconditioning sequence must be performed within the vehicle soak period. The soak period starts at the completion of the vehicle fueling following the preconditioning drive cycle and ends 12-36 hours later.
- 12.3 The butane total flow must be within  $\pm 5$  percent of the nitrogen total flow.
- 12.4 For the two-diurnal, The canister is loaded with a mixture composed of 50 percent butane and 50 percent nitrogen by volume at a rate of 40 grams/hour.
- 12.5 For the two-diurnal, the auxiliary canister must gain 2.0 grams to 3.0 grams.
- 12.6 For the three-diurnal, the specific humidity must be  $50 \pm 25$  gr/lb.



- 12.7 For the three-diurnal the butane total flow must be at least 1.5 times the canister capacity.
- 12.8 For the three-diurnal, the canister is loaded with a mixture composed of 50 percent butane and 50 percent nitrogen by volume at a rate of  $15 \pm 2$  grams/hour unless the Certification Division has authorized an accelerated rate in order to perform the canister loading in 12 hours.



### 13. Quality Provisions


- 13.1 The “Canister.vi” program automatically controls the canister loading with a mixture composed of 50 percent butane and 50 percent nitrogen at a rate of 40 grams/hour for the two-diurnal or 15 grams/hour for the three-diurnal (unless authorized to load at faster rate).
- 13.2 Completion of Form 720-01 indicates that the procedure has been followed and that all requirements of the procedure have been met.
- 13.3 System verifications are performed three times a year to ensure that the total weight gain of a designated canister is repeatable within  $\pm 5$  percent of a 40-gram load in 1 hour. Control charts are used to track the results.
- 13.4 Verifications are performed three times a year on the Sartorius scale by, one at a time, placing a 500-gram, a 1000-gram, and a 2000-gram weight on it. When the 500-gram weight is on the scale, the system will be tared and a 2-gram weight added to ensure proper system operation. All weights are traceable to the National Institute of Standards and Technology (NIST).
- 13.5 Yearly calibrations, or other calibrations necessitated by system malfunction, are performed on the mass flow controllers. The calibration is performed using the Sierra calibration bench, which is traceable to NIST standards.
- 13.6 Deviations from this procedure are documented on Form 902-01. In general, these deviations will void the data. However, the customer may choose to accept the data as variant. To do this, the customer must indicate acceptance by signing and dating Form 902-01.

### Attachment A LabVIEW Control Components

The Front Panel allows the user to set or input values and observe outputs. Inputs are referred to as “controls” and outputs as “indicators.”

The Run button, , is located in the panel palette at the top of the front panel. It changes to  when the “Canister.vi” program is running.

The Digital Indicator  and Digital Control  display the barometer, temperature, humidity, canister volume, auxiliary canister weight, and other data. Digital indicators only display data and may not be changed by the operator. The data in digital controls may be changed by clicking on it and entering the new value.

You may also use the operating tool  and click on the increment buttons, located on the left side of the digital display, to increase or decrease the values.

The Mode/Parameters window allows the operator to enter in Mode, Test Number, Operator ID, Barometer, and Canister Volumes.

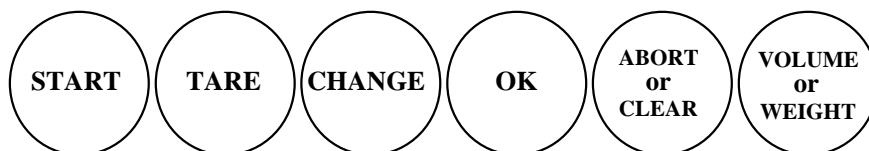
Station	CPS1
Software	Ver 3.0
Test Mode	LOAD
Test Type	3 - Day
Test Number	96-9999
Vehicle Number	1234567
Operator ID	108306
Baro (inHg)	29.94
Canister Vol (L)	1.00
Canister Cap (g)	80.00

The “Purge Aux Data” and “Load Aux Data” provide information on the test status.

Purge Aux Data	
Target Air (L)	30.00
Total Air (L)	0.00

Load Aux Data	
Target B (g)	5.60
Total B (g)	0.07
Rate B (g/h)	39.92
Total B (SCC)	28.42
Total N2 (SCC)	27.28
Ratio Total B/N	0.96

Control buttons initiate test sequences and perform other tasks for the canister preconditioning sequence.



Attachment B  
**Canister Preconditioning**

Vehicle ID # \_\_\_\_\_ Test Number \_\_\_\_\_

Canister Preconditioning Type: Two-diurnal \_\_\_\_ Three-diurnal \_\_\_\_

**Canister Purge**

- \_\_\_\_ CPS power on minimum 30 minutes
- \_\_\_\_ Humidity within specification
- \_\_\_\_ Vehicle canister ports and vents OK
- \_\_\_\_ Auxiliary canister ports and vents OK (two-diurnal only)
- \_\_\_\_ CPS hoses OK
- \_\_\_\_ CPS purge hose connected to canister tank port
- \_\_\_\_ CPS return hose connected to canister vent port
- \_\_\_\_ Vacuum used (or NA)
- \_\_\_\_ Auxiliary Canister ID # \_\_\_\_\_ (two-diurnal only)
- \_\_\_\_ Canister purged

**Canister Load**

- \_\_\_\_ For the two-day diurnal verify load rate  $40 \pm 2$  grams/hour
- \_\_\_\_ For the three-day diurnal, a load rate  $> 15 \pm 2$  grams/hour approved by Certification
- \_\_\_\_ Certification Signature
- \_\_\_\_ Load hose connected to canister tank port
- \_\_\_\_ Hose connected to canister vent port
- \_\_\_\_ Vehicle hoses reconnected

I have performed all steps in accordance with the requirements of Test Procedure 720.

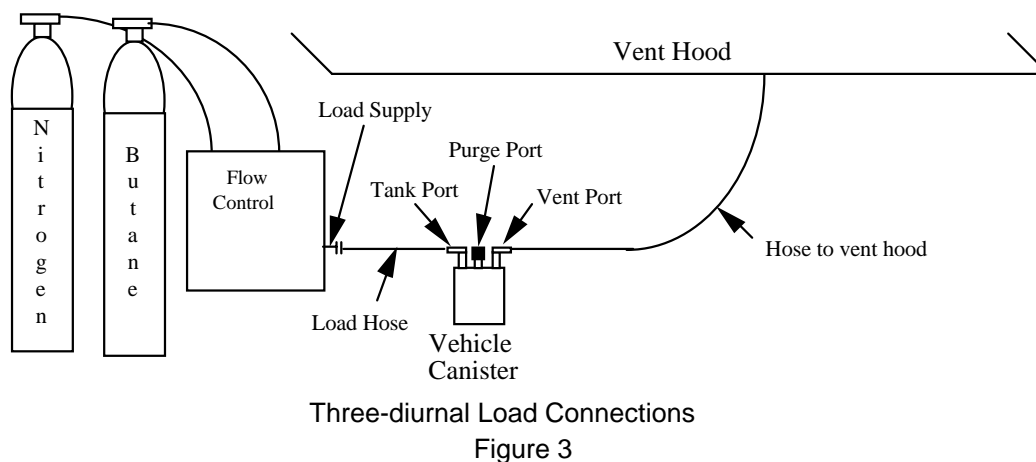
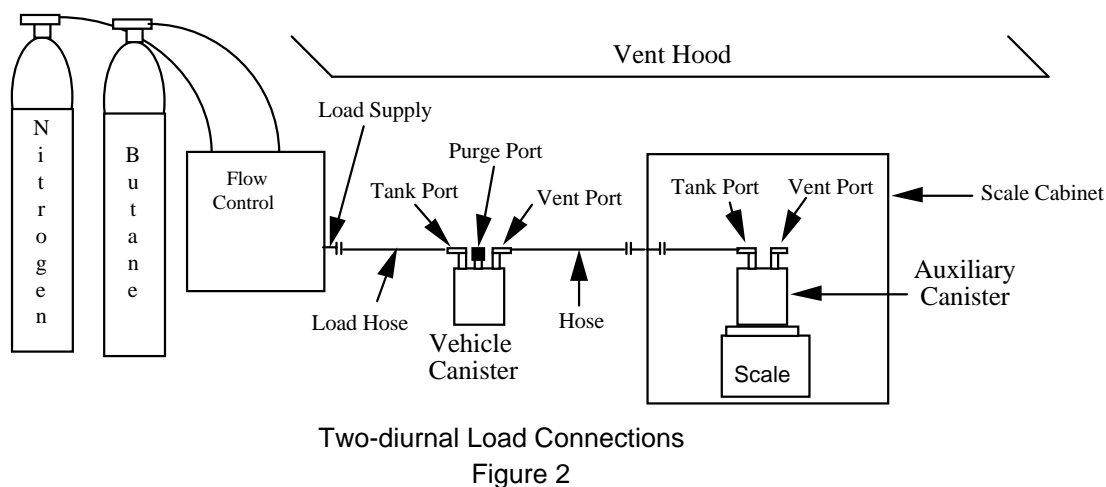
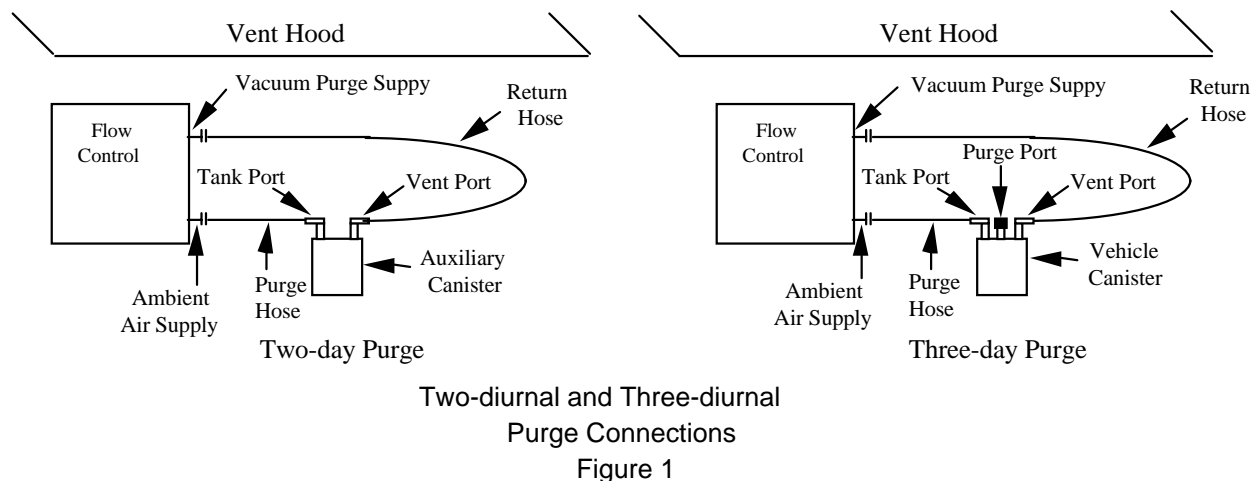
Technician's ID: \_\_\_\_\_ Date: \_\_\_\_\_

The data entries are correct and meet the requirements of Test Procedure 720.

Verified by: \_\_\_\_\_ Date: \_\_\_\_\_

## Attachment C

## Canister Preconditioning System Diagram



**Note:** The canister is not removed from the vehicle unless access is limited. Also, you may need to use the purge port instead of the vent port for some vehicle canisters.

## Attachment D

**Environmental Protection Agency  
Testing Services Division****Canister Preconditioning System  
Test Report  
Vehicle ID: 3 Test Number: CAN.#3**

Test Mode	Purge	Load
Test Type	2-Day	2-Day
Station	CPS2	CPS2
Software	Ver 3.0	Ver 3.0
Baro (inHg)	28.9	28.9
Operator ID	42131	42131
Date	3/6/96	3/6/96
Started	10:15:15	9:36:07
Ended	10:25:12	10:06:09
Elapsed	0:9:57.62	0:30:2.892
Canister Vol (L)	1	1
Canister Cap (g)	40	40
Weight (g)	N/A	N/A
Total Bu (SCC) or Air (L)	300.5708	8330.9264
Total N2 (SCC)	N/A	N/A
Total Bu / Total N2	N/A	N/A
Finish	VOLUME	ABORT
Fault	Yes	Yes

**Notes:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

I have performed all steps in accordance with the requirements of Test Procedure 720.

Technician ID#: \_\_\_\_\_ Date: \_\_\_\_\_

The data entries are correct and meet the requirements of Test Procedure 720.

Verified by: \_\_\_\_\_ Date: \_\_\_\_\_